WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Jun 17, 2024 – 10:24 AM EDT

PDB ID	:	5N0P
Title	:	Crystal structure of OphA-DeltaC18 in complex with SAH
Authors	:	Naismith, J.H.; Song, H.
Deposited on	:	2017-02-03
Resolution	:	2.16 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:

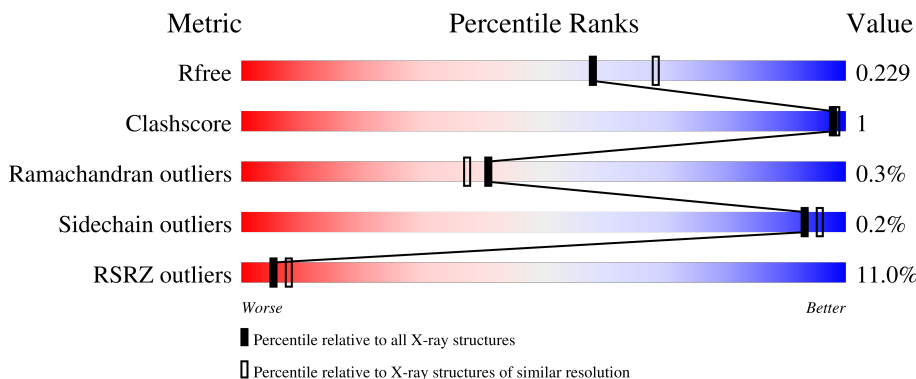|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1   Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.16 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.

Metric	Percentile Ranks	Value
Rfree		0.229
Clashscore		1
Ramachandran outliers		0.3%
Sidechain outliers		0.2%
RSRZ outliers		11.0%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	1479 (2.16-2.16)
Clashscore	141614	1585 (2.16-2.16)
Ramachandran outliers	138981	1560 (2.16-2.16)
Sidechain outliers	138945	1559 (2.16-2.16)
RSRZ outliers	127900	1456 (2.16-2.16)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	398	10% · 93% · 5%
1	B	398	11% · 88% · 10%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

| Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	EDO	B	502	-	-	-	X

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 5920 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called peptide N-methyltranferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	377	Total	C	N	O	S	0	0	0
			2922	1855	499	551	17			
1	B	360	Total	C	N	O	S	0	1	0
			2818	1791	482	528	17			

- Molecule 2 is S-ADENOSYL-L-HOMOCYSTEINE (three-letter code: SAH) (formula: $C_{14}H_{20}N_6O_5S$).
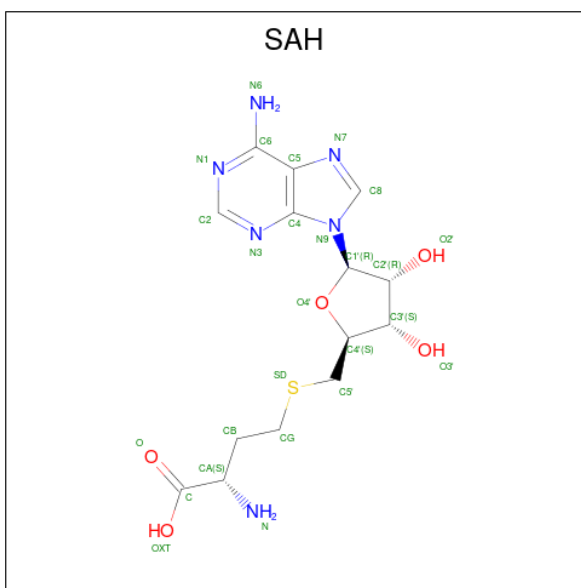
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	S	0	0
			26	14	6	5	1		
2	B	1	Total	C	N	O	S	0	0
			26	14	6	5	1		

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).

EDO

O2

OH

C1

C2

HO

O1

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 4	C 2	O 2	0	0
3	B	1	Total 4	C 2	O 2	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	55	Total 55	O 55	0	0
4	B	65	Total 65	O 65	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

• Molecule 1: peptide N-methyltranferase
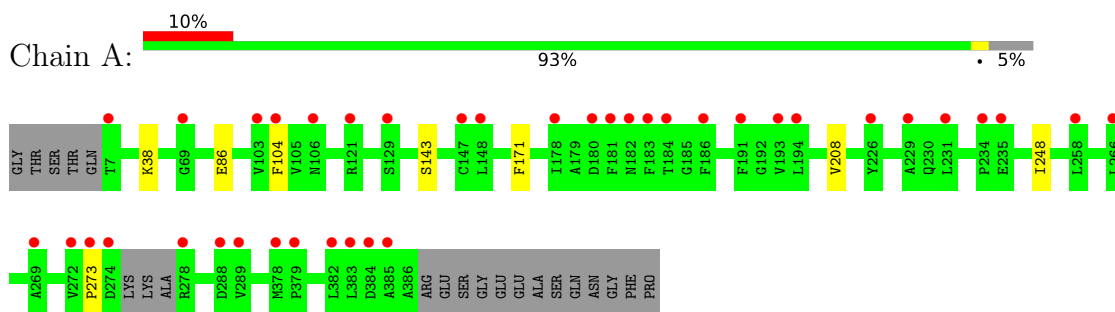
• Molecule 1: peptide N-methyltranferase
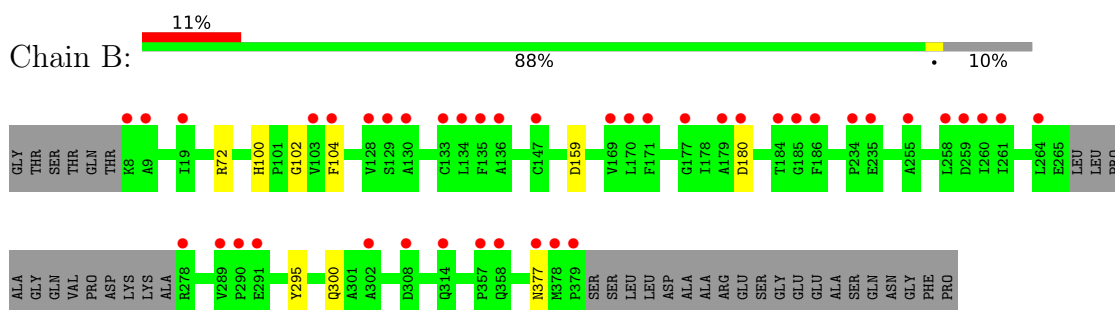
4　Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	74.80Å　　100.22Å　　124.49Å 90.00°　　90.00°　　90.00°	Depositor
Resolution (Å)	78.06　–　2.16 52.88　–　2.16	Depositor EDS
% Data completeness (in resolution range)	99.8 (78.06-2.16) 99.8 (52.88-2.16)	Depositor EDS
R_{merge}	0.03	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	2.12 (at 2.16Å)	Xtriage
Refinement program	REFMAC 5.8.0158	Depositor
R, R_{free}	0.200　,　0.226 0.205　,　0.229	Depositor DCC
R_{free} test set	2499 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å^2)	55.3	Xtriage
Anisotropy	0.188	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 44.8	EDS
L-test for twinning[2]	$<|L|> = 0.49$, $<L^2> = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	5920	wwPDB-VP
Average B, all atoms (Å^2)	73.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.39% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $<|L|>$, $<L^2>$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5   Model quality ⓘ

5.1   Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: SAH, EDO

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$|Z|$ >5	RMSZ	#$|Z|$ >5
1	A	0.47	0/2990	0.64	0/4068
1	B	0.50	0/2885	0.66	0/3922
All	All	0.49	0/5875	0.65	0/7990

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2   Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2922	0	2885	5	0
1	B	2818	0	2775	4	0
2	A	26	0	19	0	0
2	B	26	0	19	0	0
3	A	4	0	6	0	0
3	B	4	0	6	0	0
4	A	55	0	0	0	0
4	B	65	0	0	0	0
All	All	5920	0	5710	8	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 1.

All (8) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:100:HIS:HD2	1:B:102:GLY:H	1.52	0.57
1:A:208:VAL:HG12	1:A:248:ILE:HD12	1.92	0.51
1:A:143:SER:HB3	1:B:104:PHE:CD2	2.51	0.46
1:B:72:ARG:NH2	1:B:180:ASP:O	2.50	0.44
1:A:104:PHE:CE1	1:A:171:PHE:CD2	3.06	0.43
1:A:104:PHE:CZ	1:A:171:PHE:CD2	3.06	0.43
1:B:295:TYR:HB3	1:B:300:GLN:HE21	1.84	0.43
1:A:38:LYS:HD3	1:A:86:GLU:HG3	2.01	0.42

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	373/398 (94%)	357 (96%)	15 (4%)	1 (0%)	41	37
1	B	357/398 (90%)	345 (97%)	11 (3%)	1 (0%)	41	37
All	All	730/796 (92%)	702 (96%)	26 (4%)	2 (0%)	41	37

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	377	ASN
1	A	273	PRO

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	313/329 (95%)	313 (100%)	0	100	100
1	B	301/329 (92%)	300 (100%)	1 (0%)	92	95
All	All	614/658 (93%)	613 (100%)	1 (0%)	93	96

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	159	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	28	GLN
1	A	78	GLN
1	A	314	GLN
1	B	28	GLN
1	B	100	HIS
1	B	300	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

4 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
2	SAH	A	501	-	24,28,28	1.12	4 (16%)	25,40,40	1.44	4 (16%)
2	SAH	B	501	-	24,28,28	0.99	1 (4%)	25,40,40	1.50	5 (20%)
3	EDO	B	502	-	3,3,3	0.48	0	2,2,2	0.29	0
3	EDO	A	502	-	3,3,3	0.48	0	2,2,2	0.23	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	SAH	A	501	-	-	4/11/31/31	0/3/3/3
2	SAH	B	501	-	-	3/11/31/31	0/3/3/3
3	EDO	B	502	-	-	0/1/1/1	-
3	EDO	A	502	-	-	1/1/1/1	-

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	SAH	C5-C4	2.40	1.47	1.40
2	B	501	SAH	C5-C4	2.40	1.47	1.40
2	A	501	SAH	OXT-C	-2.14	1.23	1.30
2	A	501	SAH	C2-N3	2.07	1.35	1.32
2	A	501	SAH	O4'-C1'	2.03	1.43	1.41

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	SAH	N3-C2-N1	-4.24	122.05	128.68
2	A	501	SAH	N3-C2-N1	-3.94	122.52	128.68
2	A	501	SAH	OXT-C-O	-2.97	117.33	124.09
2	B	501	SAH	OXT-C-O	-2.76	117.82	124.09
2	B	501	SAH	C4-C5-N7	-2.57	106.72	109.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	501	SAH	OXT-C-CA	2.28	121.14	113.38
2	B	501	SAH	OXT-C-CA	2.04	120.33	113.38
2	A	501	SAH	C4-C5-N7	-2.03	107.28	109.40
2	B	501	SAH	C1'-N9-C4	-2.02	123.09	126.64

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	SAH	O4'-C4'-C5'-SD
2	A	501	SAH	C3'-C4'-C5'-SD
3	A	502	EDO	O1-C1-C2-O2
2	A	501	SAH	OXT-C-CA-CB
2	B	501	SAH	C3'-C4'-C5'-SD
2	A	501	SAH	O-C-CA-CB
2	B	501	SAH	OXT-C-CA-CB
2	B	501	SAH	O-C-CA-CB

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand SAH A 501

Bond lengths

Bond angles

Torsions

Rings

Ligand SAH B 501

Bond lengths

Bond angles

Torsions

Rings
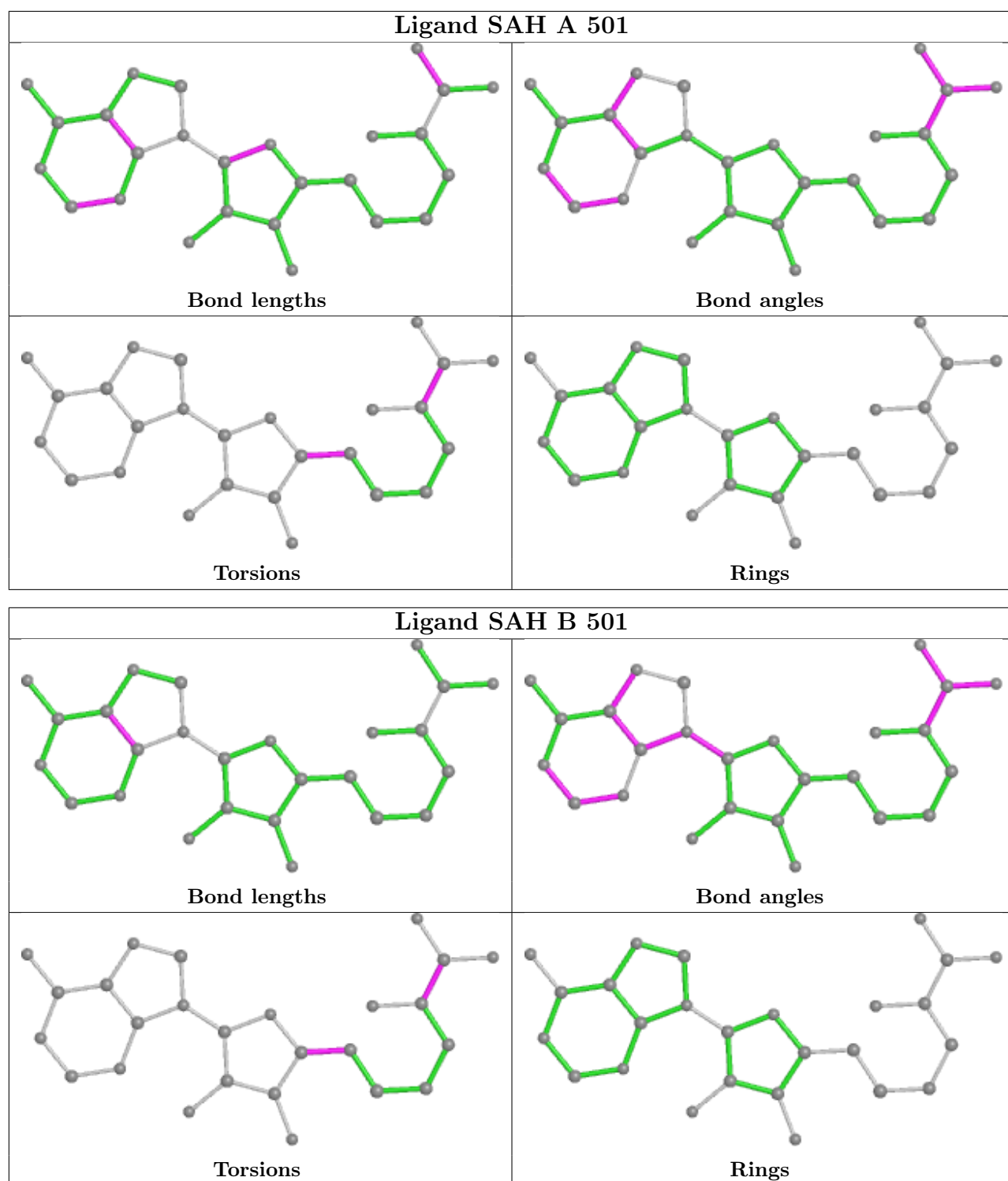
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	377/398 (94%)	0.53	39 (10%)	6	9	39, 71, 128, 159	0
1	B	360/398 (90%)	0.51	42 (11%)	4	6	38, 67, 105, 125	2 (0%)
All	All	737/796 (92%)	0.52	81 (10%)	5	8	38, 69, 119, 159	2 (0%)

All (81) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	264	LEU	9.9
1	A	183	PHE	8.7
1	A	184	THR	8.2
1	B	379	PRO	7.6
1	A	181	PHE	5.9
1	B	378	MET	5.6
1	A	180	ASP	5.4
1	A	379	PRO	5.3
1	B	186	PHE	5.2
1	A	182	ASN	5.0
1	A	384	ASP	4.7
1	A	272	VAL	4.7
1	B	104	PHE	4.6
1	B	260	ILE	4.6
1	A	289	VAL	4.5
1	A	278	ARG	4.1
1	B	234	PRO	4.1
1	B	314	GLN	4.0
1	B	358	GLN	3.8
1	B	180	ASP	3.8
1	B	278	ARG	3.7
1	A	234	PRO	3.5
1	B	130	ALA	3.5
1	A	186	PHE	3.4

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Mol	Chain	Res	Type	RSRZ
1	B	290	PRO	3.4
1	B	258	LEU	3.3
1	B	134	LEU	3.2
1	A	266	LEU	3.2
1	B	302	ALA	3.2
1	A	235	GLU	3.1
1	B	291	GLU	3.1
1	B	184	THR	3.0
1	A	273	PRO	3.0
1	A	193	VAL	3.0
1	A	274	ASP	3.0
1	B	179	ALA	3.0
1	B	133	CYS	2.9
1	A	258	LEU	2.9
1	B	103	VAL	2.9
1	B	8	LYS	2.9
1	B	19	ILE	2.8
1	A	269	ALA	2.8
1	B	235	GLU	2.8
1	A	104	PHE	2.7
1	B	169	VAL	2.7
1	B	261	ILE	2.7
1	A	194	LEU	2.7
1	A	226	TYR	2.7
1	B	128	VAL	2.7
1	B	177	GLY	2.6
1	B	255	ALA	2.6
1	A	7	THR	2.6
1	A	383	LEU	2.6
1	A	288	ASP	2.5
1	B	129	SER	2.5
1	B	171	PHE	2.4
1	A	382	LEU	2.4
1	B	170	LEU	2.4
1	A	129	SER	2.4
1	A	178	ILE	2.4
1	A	106	ASN	2.3
1	B	377	ASN	2.3
1	A	231	LEU	2.3
1	B	9	ALA	2.3
1	A	378	MET	2.3
1	A	103	VAL	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	259	ASP	2.3
1	A	385	ALA	2.2
1	A	121	ARG	2.2
1	A	148	LEU	2.2
1	B	135	PHE	2.2
1	B	147	CYS	2.2
1	A	69	GLY	2.2
1	B	289	VAL	2.1
1	A	147	CYS	2.1
1	B	308	ASP	2.1
1	A	191	PHE	2.1
1	A	229	ALA	2.1
1	B	136	ALA	2.1
1	B	357	PRO	2.0
1	B	185	GLY	2.0

6.2　Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

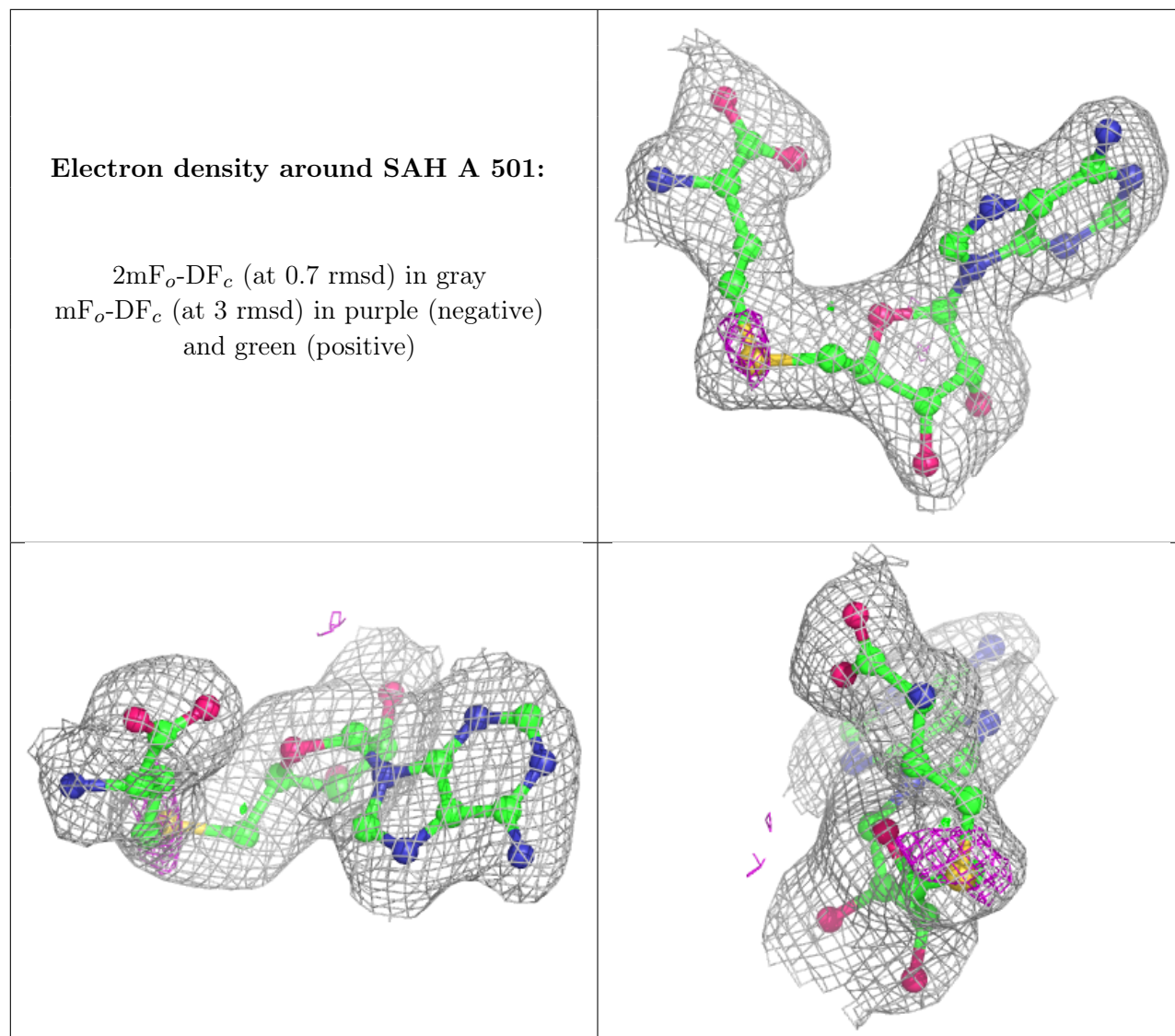## 6.3　Carbohydrates ⓘ

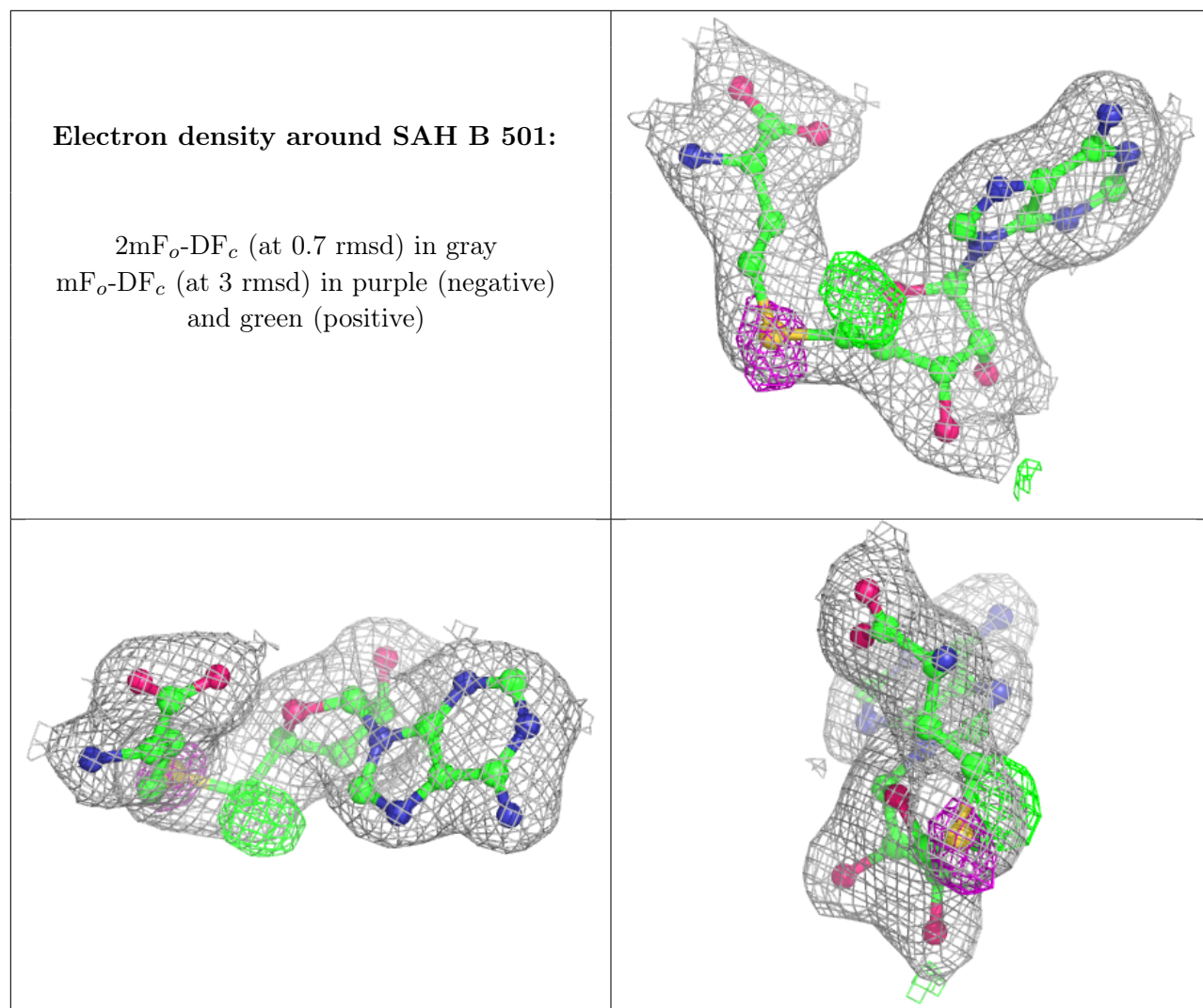There are no monosaccharides in this entry.

6.4　Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	EDO	B	502	4/4	0.36	0.52	100,103,104,105	0
3	EDO	A	502	4/4	0.87	0.36	84,86,87,89	0
2	SAH	A	501	26/26	0.94	0.14	48,57,65,67	0
2	SAH	B	501	26/26	0.96	0.19	42,45,52,58	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different

orientation to approximate a three-dimensional view.

Electron density around SAH A 501:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around SAH B 501:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

6.5 Other polymers ⓘ

There are no such residues in this entry.